# CURRICULUM VITAE

**Name:** Maliha S. Nash
**Citizenship:** USA

## I. EDUCATION

New Mexico State University, Ph.D. (1985-1990)
Major: Soil Physics
Associated Fields: Geostatistics and Experimental Statistics
Dissertation: "Temporal and spatial variability of soil moisture on the Jornada range in southern New Mexico, Dec. 1989"

New Mexico State University, M.S. (1982-1985)
Major: Soil Physics
Associated Fields: Geostatistics and Experimental Statistics

University of Baghdad, B.S. (1972-1976)
College of Agriculture
Major: Soil Science

## II. AWARDS

- Bronze medal, 2015, EnviroAtlas Team, for development of EnviroAtlas: an interactive web-based tool of ecosystem benefits, demographics, and stressors that informs assessments and decisions at national to community scales.
- Honor Award, October 2015. The Office of Solid Waste ER Office of Resource Conservation and Recovery (OSWER) Leadership presented NERL's Maliha Nash with the Honor Award for Team Excellence.
- Excellence in Service Award, April 2015. The Office of Solid Waste ER Office of Resource Conservation and Recovery (OSWER) presented NERL's Maliha Nash with the Excellence in Service Award for her assistance on the Waste Analysis Plan Guidance Workgroup. Maliha provided expertise on the statistical components, including the data quality objectives component of the rewriting of the 1994 "Waste Analysis at Facilities that Generate, Treat, Store and Dispose of Hazardous Waste: A Guidance Manual Guidance".
- EPA, STAA (Scientific & Technology Achievement Award) Silver Medal (Level II), 2013:
    1. Temporal Patterns and Sources of Atmospherically Deposited Pesticides in Alpine Lakes of the Sierra Nevada, California, USA, Environmental Science & Technology, 44:4609-4614, (2010)
    2. Spatial Patterns of Atmospherically Deposited Organic Contaminants at High-Elevation in the Southern Sierra Nevada Mountains, California Environmental Toxicology and Chemistry, 29:1056-1066, (2010)
    3. Pesticide Distributions and Population Declines of California, USA, Alpine Frogs, *Rana muscosa* and *Rana sierra*. Environmental Toxicology and Chemistry, 30:682-691,(2011)
- EPA, STAA (Scientific & Technology Achievement Award) Honorable Mention 2011: Development of an Innovative Watershed-Scale Monitoring and Assessment Technique to Sustain the Nation's Water Resources.
- EPA, STAA (Scientific & Technology Achievement Award) Silver Medal (Level II), 2007: New York City Water Supply Research with Demonstration Tangible Environmental and Economic Impact.
- Excellence in Service Award, 2015. The OSWER Office of Resource Conservation and Recovery presented NERL's Maliha Nash with the Excellence in Service Award

for her assistance on the Waste Analysis Plan Guidance Workgroup. Maliha provided expertise on the statistical components, including the data quality objectives component of the rewriting of the 1994 "Waste Analysis at Facilities that Generate, Treat, Store and Dispose of Hazardous Waste: A Guidance Manual Guidance".

- EPA, Special Accomplishment Recognition Award 2004, Noteworthy Accomplishment including one-time acts or high quality performance; publications of three journal articles in open scientific literature, first author on each of the three entitled (*cv* VI, 32, 33, 34 and 36). All of these articles were part of developing indicator and rangeland health studied for EMAP.
- EPA, Special Accomplishment Recognition Award 2003, Unique contributions to the Landscape Ecology Branch programs by performing research in many topic area including landscape ecology, statistics, biology, geographic information system technique, and remote sensing. Pioneered the use of two techniques that are well known in chemometrics for analyses of landscape, stream biota, and water quality data (partial least squares, PLS, analyses and canonical correlation, CC, analysis).
- EPA, Award of Excellence for Superior Contribution in the final production of the Savannah River Watershed publication, 2002.
- Special Accomplishment Recognition Awards in 1999, 2000, 2001, 2005, and 2007.
- EPA, Award (Team) and performance 2003, 2006, 2007
- National Research Council Award (1995-1998), Senior Fellowship.
- Community College of Southern Nevada, Department of Philosophical and Regional Studies, Appreciation letter (2004).
- American Statistical Association, Special Awards Judge (2009).

## III. WORK HISTORY

**Environmental Protection Agency**, Las Vegas, NV

**Research Statistician, GS-1530-14** 01/2017 – Present

**from Dec 2016 to present**

- Applying GIS, Remote Sensing, and Statistics for interpolating the consequences of climatic factors on greenness changes over 25 years to the contiguous US. I used time series analyses to describe, quantify changes in greenness, and link changes to either climatic or anthropogenic effect.
- Wrote a report, working on a book chapter, and published three peer review journal articles, coauthor on oral presentations of research results at conferences nationally and internationally (~10), review literature and keep abreast of research efforts in statistics, ecology and landscape ecology.
- Team member in many research teams, including on the Agency's high priority Tire Crumb studies research team.
- Provide statistical guidance to non EPA (e.g. University of Nevada at Las Vegas, UNLV) and EPA (e.g., Regions, Western Ecology Division, Corvallis, Oregon).

**Environmental Protection Agency**, Las Vegas, NV

**Statistician, GS-1530-13** 08/01 – 12/2016

- Develop GIS and Remote Sensing, Watershed Modeling and Statistics for interpolating the consequences of landscape changes on aquatic and terrestrial resources. In addition to the traditional statistical methods, I use new statistical methods to describe and quantify relationships between surface water constituents and landscape metrics.
- Prepare reports (14), book chapters (3), proceeding (5) and peer review journal articles (42), oral presentations of research results at conferences nationally and internationally (~30), review literature and keep abreast of research efforts in statistics, ecology and landscape ecology.
- Team member in 9 research teams, including on the Agency's high priority Hydraulic Fracturing research team.

- Provide statistical guidance to non EPA (e.g. Environmental Security Technology Certification Program, ESTCP) and EPA (e.g., Regions, Western Ecology Division, Corvallis, Oregon; and Ecological Research Division, Athens, Georgia).

**Environmental Protection Agency**, Las Vegas, NV
**Physical Scientist** (4 years post Doc Position) 07/98–08/01

- Integrated GIS, remote sensing, and water quality data in Watershed Modeling and Statistics for interpolating the consequences of landscape changes on aquatic and terrestrial resources.
- I developed and/or helped in formulating statistical models to describe changes of biological and abiotic variables in time and space. During this time I was a member in three research teams and authored or co-authored nine peer reviewed journal articles.

**Environmental Protection Agency**, Las Vegas, NV
**Senior Research Associate** (National Research Council, Research Associate) 05/95–04/98

- Analyses of disturbance gradient to determine if ecosystem properties and processes change in a predictable pattern along gradsects. The study area was in the Jornada Experimental Range, Las Cruces, NM. Data sets included: soil properties; vegetation; ant and bird assemblages; and soil microorthopod populations.
- Involved in data collection, data management, analyses using classical and spatial. Results were published as five peer reviewed journal articles.

**Foothill Engineering Co. / U S Geological Survey, Nuclear Hydrology Program,** Nevada Test Site, Mercury, Nevada.
**Hydro-geologist** 03/92-05/95

Work was in the field of water movement, distribution and status in relation with geological formations at Yucca Mountain, Nevada. My responsibilities included:

- Investigation of deterministic relationships between infiltration rates and physical/hydrologic properties of soils and exposed volcanic rocks and Assisting in the collection and analysis of data from the artificial-infiltration activity;
- Assisting in the interpretation of neutron-moisture data and development, and assessment of unsaturated-zone computer models of natural infiltration to interpretations of neutron-moisture data to predict infiltration rates in areas where little information existed;
- Preparing scientific reports documenting collection;
- Analysis of data, hydrologic modeling and results of investigations;
- Monthly field measurements of water content using CPN Hydro-probe.

Work accomplished:

- Laboratory determination and analysis of water potential of the consolidated and unconsolidated materials;
- Field and laboratory measurements and characterization of hydrologic properties for small watershed; physical and topographical measurements were made along three transects in a wash, ran and analyzed modeled radiation load along these transects;
- Studied rainfall distribution and fit a stochastic model to it based on regional rainfall data;
- Trained for Quality Assurance, Technical Data Information Form; Procurement, and Technical procedure review; documenting results for publishing and presentation;
- Understand theory and calibration of lab psychrometer (chilled mirror psychrometer), tensiometer and neutron moisture probe;
- Public interaction through technical and public tours.

**Department of Experimental Statistics, New Mexico State University**, Las Cruces, NM.
**Graduate Research Assistant** 06/91-05/92
Teaching assistant and helped in analyzing experimental data.

**Department of Agronomy and Horticulture, New Mexico State University**, Las Cruces, NM.
**Research Specialist** 05/91-06/91

Collect and summarize data from research done in High Plains area of New Mexico.

**Department of Agronomy and Horticulture, New Mexico State University**, Las Cruces, NM.
**Graduate Research Assistant/Teaching Assistant** 01/82-12/89

- Conducted several field and laboratory experiments (in cultivated and arid range land) investigating spatial and temporal variability of soil water content, soil water tension, texture, hydraulic conductivity, drainage rates, vegetation cover, and precipitation, that collected systematically on a line transect.
- Geostatistics and time series models for above studies were conducted and results were published in six peer review journals.
- Conducted laboratory studies of movement of chloride, tritium, boron and chromium through disturbed soil columns using classical convective-dispersion equations. Main Frame and PC computers were used to run programs, analyze data, graphing, and word processing. Results were published in a research report.

**Department of Agronomy, Mississippi State University**, Starkville, Mississippi,
**Research Assistant** 08/81-12/81

Collected and helped analyze soil and crop properties data resulting from experimental SPAR (Soil Plant Atmosphere Relationships) chambers.

**Soil Organization of Soil and Land Reclamation (SOSLR),** Consumptive Use Research, Baghdad, Iraq.
**Agricultural Engineer** 06/76-06/79

- A team lead in the field of consumptive use, which is an initial requirement in designing irrigation channels.
- Field experimental designs and sampling methodology were also developed.
- Collected crop, soil and meteorological data to predict the potential evapotranspiration for growing crops. Soil data included water tension, water content, bulk density particle density, texture, CEC, and SAR.
- Meteorological data were used in the Penman equation with the soil data, to calculate potential evapotranspiration.
- Scientific reports (in Arabic) were prepared and published.
- Several irrigation methods were exercised in an effort to use water efficiently to reduce the salinity problem, which is common in an arid range land.
- Tensiometer, gypsum blocks, and pressure plates were used to generate the water release curve, and, along with the soil water depletion, the amount and schedule of irrigation were determined.

## IV. Committee & Consultant Appointments, Professional Society Elected Appointments, Adjunct Faculty Appointments, Advisory & Editorial Appointments:

1. I was adjunct professor in Mathematics and Statistics for the College of Southern Nevada, Las Vegas, Nevada (07/97-2015).
2. I am a regular reviewer for Journal of Arid Environment, Ecological Indicator, ecological Society of America, Environmental Monitoring and Assessment, Landscape Ecology, Journal of Rangeland Ecology and Management, International Journal of Remote Sensing, Science of Total Environment.
3. I assisted and chaired a session in the following conferences:
    - The Fourth International conference in Environmetrics and Chemometrics, September 2000. Chaired "Soils-Fate and Transport" session.
    - 2001 STAR Fellowship Conference, National Center for Environmental Research and Quality Assurance, Washington DC.
    - International Association for Landscape Ecology, March 2004.
4. I advised several graduate students (MS and PhD, University of Nevada Las Vegas, UNLV).
5. I served as a science Judge for Clark County School District, Academy of Science and Math, Hyde Park Middle Scholl, Las Vegas, NV. 1999.

6. I was invited as a Science Jugde at the Intel International Science and Engineering Fair (Intel ISEF) May 10 - May11, 2011
7. I was invited as an independent review panel member for a research grade evaluation for USGS Geographers for promotion in 2008. There were eleven scientists reviewed by five to six panel members.

## V. INVITED LECTURE AND SEMINARS (selected)

1. **Nash MS**, and Meadows D. 2014. Change in Landscape Greenness: Anthropogenic or Natural Proof Of Concept: selected study areas. Presented to US Forest Service and EPA Office of Water, November 18th 2014, Washington DC.
2. **Nash MS,** Chaloud DJ, Kepner WG, and Sarri S. 2007. Regional assessment of landscape and land use change in the Mediterranean Region: Morocco case study (1981-2003). NATO Advanced Research Workshop "Environmental change and Human Security and Acting on Hazard Impact" June 4-June 7 2007. Pell Center for International Relations and Public Policy, New Port, Rhode Island, USA (presented by Bill Kepner).
3. **Nash MS.** 2006. Locating Areas of Concern, Combined GIS and Statistical Analyses; EPA-GIS work group, Sep 19-22, 2006 Cincinnati Ohio. (Presented by Ann Pitchford).
4. **Nash MS**, Chaloud DJ, and Kepner WG. 2007. Statistical, Remote Sensing and GIS to locate Changes in Land Resources. Joint EPA GIS Work Group and Statistic User Group, Las Vegas NV. September 18 2007.
5. **Nash MS**, Wade TG, Heggem DT, and Wickham JD. 2003. Do Anthropogenic Activities or Nature Dominate the Shaping of the Landscape in the Oregon Pilot Study Area for 1990-1999? NATO - CCMS and Science Committee Workshop on Desertification in the Mediterranean Region. A Security Issue. Valencia (Spain), 2-5 December 2003. (Poster sent to the conference in Spain).
6. **Nash MS,** and Whitford WG. 2000. Ants as Biological Indicators for Monitoring Changes in Arid Environments: Lessons for Monitoring Protected Areas. 1st International Symposium and Workshop on Arid Zone Environment Research and Management options for protected Areas. 23rd - 25th Jan. 2000, Abu Dhabi, UAE.
7. **Nash MS,** and Whitford WG. 1997. Characterization, monitoring, and assessment of arid range land in the Jornada desert, Las Cruces, NM, USA. Jordan University of Science & Technology, Irbid, Jordan. Dec. 1997.

## VI. PUBLICATIONS (PEER REVIEWED JOURNAL ARTICLES IN ASCENDING ORDER IN TIME)

1. Morgan, M.K., **M. Nash**, D. B. Barr, J. M. Starr, M. S. Clifton and J. R. Sobus. 2018 Distribution, Variability, and Predictors of Urinary Bisphenol-A Levels in 50 North Carolina Adults over a Six-Week Monitoring Period. *Environment International,* 112: 85-99.
2. **Nash MS**, Wickham J, Christensen J, Wade T. 2017. Changes in landscape greenness and climatic factors over 25 years (1989-2013) in the USA. *MDBI Remote Sensing*, 9 (3), 295; doi:10.3390/re9030295. Impact factor 3.036.
3. Pickard BR, **Nash MS**, Baynes J and Mehaffey M. 2017. Planning for community resilience to future Unites States domestic water demand. *Landscape and Urban Planning* 158: 75-86.
4. Wickham J, **Nash MS**, Barnes CA. 2016. Effect of land cover change on snow free surface albedo across the continental United States. *Global and Planetary Change*, 146: 1-9.
5. Christensen JR, **MS Nash,** D Chaloud D and A Pitchford. 2016. Spatial Distribution of Small Water Body Types across Indiana Ecoregions. *Ecohydrology* 9,122-137. DOI: 10.1002/eco.1618.
6. Wickham J, CA Barnes CA, **MS Nash**, TG Wade, 2015. Combining NLCD and MODIS to create a land cover- albedo dataset for the continental United States. *Remote Sensing of Environment 170:143-152.* doi:10.1016/j.rse.2015.09.012
7. **Nash MS**, Bradford DF, Wickham JD, and Wade TG. 2014. Detecting Change in Landscape Greenness over Large Areas: An Example for New Mexico, USA. *Remote Sensing of Environment.* 150: 152-162.
8. Mbonimpa EG, Yuan Y, **Nash MS,** and Mehaffey MH. 2014. Sediment and total phosphorous contributors in Rock River watershed, *Journal of Environmental Management* 133:214-221.

9. Christensen JR, **Nash MS,** and Neale, AC. 2013. Identifying Riparian Buffer Metrics Related to Water Quality in the Southeastern Coastal Plain, *Environmental Management* 52:1161-1176.
10. Bradford DF, Stanley K, Tallent-Halsell NG, Sparling DW, **Nash MS**, Knapp RA, McConnell LL, and Simonich SM. 2013. Temporal and Spatial Variation of Atmospherically Deposited Organic Contaminants at High Elevation in Yosemite National Park, California, USA. *Environmental Toxicology and Chemistry/ Society of Environmental Toxicology and Chemistry*. 32: 517-525.
11. Bradford DF, Kramer JL, Gerstenberger SL, Tallent-Halsell NG, and **Nash MS.** 2012. Mercury in Tadpoles Collected from Remote Alpine Sites in the Southern Sierra Nevada Mountains, California, USA. *Archive of Environmental Contamination and Toxicology*. 62:135-140.
12. Tallent-Halsell NG, **Nash MS**, Cross C, and Walker L. 2011. The Vegetation and Soils of the Drawdown Zone around a Reservoir: Lake Mohave, Nevada and Arizona, USA. *Western North American Naturalist* 71: 374-387.
13. Lybbert TJ, Aboudrare A, Chaloud Dj, Magnan N, and **Nash MS.** 2011. Booming Markets for Moroccan argan oil appear to benefit some rural households while threatening the endemic argan forest. *Proceeding of the National Academy of Science* 108:13963-13968. Total citation 1269 as of Sep 7 2016
14. Nie W, Yuan Y, Kepner W, **Nash MS**, Jackson M, and Erickson C. 2011. Assessing Impacts of Landuse Changes on Hydrology for the Upper San Pedro Watershed. *Journal of Hydrology* 407:105-114.
15. **Nash MS,** and Chaloud DJ. 2011. Partial Least Square Analyses of Landscape and Surface Water Biota Associations in the Savannah River Basin. *International Scholarly Research Network (ISRN) Ecology*2011.
16. Bradford DF, Stanley K, McConnell LL, Tallent-Halsell NG, **Nash MS**, Simonich SM, and Sparling DW. 2010. Spatial Patterns of Atmospherically Deposited Organic Contaminants at High Elevation in the Sierra Nevada Mountains, California. *Environmental Toxicology and Chemistry/Society of Environmental Toxicology and Chemistry* 29: 1056-1066.
17. Jones KB, Slonecker TE, **Nash MS**, Neale AC, Wade TG, Wickham JD, and Hamann S. 2010. Riparian Habitat Change across the Continental United States (1972-2003) and Potential Implications for Sustaining Multiple Ecosystem Services. *Landscape Ecology* 16:301-312.
18. Bradford DF, Knapp RA, Sparling DW, **Nash MS**, Stanley KA, Tallent-Halsell NG, McConnell LL, and Simonich SM. 2010. Pesticide Distributions and Population Declines of California, USA, Alpine Frogs, Rana Muscosa and Rana Sierrae. *Environmental Toxicology and Chemistry (Society of Environmental Toxicology and Chemistry* 30:682-91.
19. Bradford DF, Heithmar E, Tallent-Halsell N, Momplaisir GM, Rosal C, Varner K, **Nash MS,** and Riddick L. 2010. Temporal Patterns and Sources of Atmospherically Deposited Pesticides in Alpine Lakes of the Sierra Nevada, California, USA. *Environmental Science and Technology*. 44:4609-4614.
20. **Nash MS**, Heggem DT, Donald E, Wade TG, and Hall RK. 2009. Multi-Scale landscape factors influencing stream water quality in the State of Oregon. *Environmental Monitoring and Assessment*. 156:343-360.
21. Lopez RD, **Nash MS**, Heggem DT, and Ebert DW. 2008. Watershed Vulnerability Predictions for the Ozarks using Landscape Metrics. *Journal of Environmental Quality*. 37(5): 1769-1780.
22. Lopez, RD, **Nash MS**, Heggem DT, and Ebert DW. 2008. Using landscape metrics as indicators of surface water nutrient parameters in the Ozark Mountains, USA. *30th Congress of the International Association of Theoretical Proceedings Ed.: Jones, J. Red.L Faaborg, Janice. Verhandlungen des Internationalen Verein Limnologie*. 30: 349-356. https://www.schweizerbart.de/publications/detail/isbn/9783510540747/Verhandlungen_der_IVL_Volume_30_Part_3
23. Mehaffey MH, **Nash MS**, Neale AC, and Pitchford AM. 2006. Biological Integrity in Mid-Atlantic coastal plains headwater streams. *Environmental Monitoring and Assessment*. 124:141-156.
24. Wickham JD, **Nash MS,** Wade TG, and Currey L. 2006. Statewide empirical modeling of bacterial contamination of surface waters. *Journal of American Water Resources Association*, 42: 583-591.
25. Mehaffey MH, **Nash MS**, Wade TG, Ebert DW, Jones KB, and Rager A. 2005. Linking Land Cover and Water Quality in New York City's Water Supply Watersheds. *Environmental Monitoring and Assessment* 107: 29 - 44.

26. **Nash MS,** Chaloud DJ, and Franson SE. 2005. Association of Landscape Metrics to Surface Water Biology in the Savannah River Basin. *Journal of Mathematics and Statistics* 1: 29-34.
27. **Nash MS.** Bradford DF, Franson SE, Neale AC, Whitford WG, and Heggem DT. 2004. Livestock Grazing Effects on Ant Communities in the Eastern Mojave Desert, USA. *Ecological Indicators*. 4: 199- 213.
28. **Nash MS,** and Whitford WG. 2004. Understanding an Ecological System: An Example of Temporal and Spatial Variability of *Dorymyrmex* (*Conomyrma*) *insana* in a Stressed System. *Journal of Animal and Veterinary Advances* 3(9): 630-636.
29. **Nash MS,** Jackson E, and Whitford WG. 2004. Effects of Intense, Short-Duration Grazing on Microtopography in a Chihuahuan Desert Grassland. *Journal of Arid Environment* 56: 383-393.
30. **Nash MS**, Jackson E, and Whitford WG. 2003. Soil Microtopography on Grazing Gradients in Chihuahuan Desert Grasslands. *Journal of Arid Environment* 55: 181-192.
31. Bradford DF, Neale AC, **Nash MS**, Sada DW, and Jaeger JR. 2003 Habitat Patch Occupancy by the Red-Spotted Toad (*Bufo Punctatus*) in a Naturally Fragmented, Desert Landscape. *Ecology*, 84: 1012-1023.
32. Wade TG, Wickham D, **Nash MS**, Neale AC, Riitters KH, and Jones KB. 2003. A comparison of vector and raster GIS methods for calculating landscape metrics used in Environmental assessments. *Photogrammetric Engineering & Remote Sensing*. 69: 1399-1405.
33. Jones KB, Neale AC, Wade TG, Wickham JD, Cross C, Edmonds CM, Loveland TR, **Nash MS**, and Riitters KH. 2002. The Consequences of Landscape Change on Ecological Resources: An Assessment of the United States Mid-Atlantic Region. *Ecosystem Health* 7:229-242.
34. **Nash MS**, Whitford WG, Bradford DF, Franson SE, Neale AC, and Heggem DT. 2001. Ant Communities and Livestock Grazing in the Great Basin, USA. *Journal of Arid Environment*. 49: 695-710.
35. Jones KB, Neale AC, **Nash MS**, Van Remortel RD, Wickham JD, Riitters KH, and O'Neil RV. 2001. Predicting Nutrient and Sediment Loadings to Streams from Landscape Metrics: A Multiple Watersheds study from the United States Mid-Atlantic Region. *Landscape Ecology*. 16:301-312.
36. Jones KB, Heggem DT, Wade TG, Neale AC, **Nash MS**, Mehaffey MH, Hermann KA, Selle AR, Augustine S, Goodman IA, Pedersen J, Bolgrien D, Viger JM, Chaing D, Lin CJ. Zhong Y, Baker J, and VanRemortel R. 2000. Assessing Landscape Condition Relative to Water Resources in the Western United States: Strategic Approach. *Environmental Monitoring and Assessment* 64:227-245.
37. Jones KB, Neale AC, **Nash MS**, Riitters KH, Wickham JD, O'Neill RV, and Van Remortel RD. 2000. Landscape correlates of breeding Bird Richness across the United States Mid-Atlantic Region. *Environmental Monitoring and Assessment* 63:159-174.
38. **Nash MS**, Whitford WG, Vanzee J, and Havstad K. 2000. Ant (homoptera, Formicidae) Response to Environmental stressors in the Northern Chihuahaun desert. *Environmental Entomology*. 29: 200-206.
39. **Nash MS**, Whitford WG, deSoyza A, and Vanzee J. 1999. Livestock activity and Chihuahuan desert annual plant communities: boundary analysis of disturbance gradients. *Ecological Application* 9: 814-823.
40. **Nash MS**, Anderson JP, and Whitford WG. 1999. Spatial and Temporal variability in relative abundance and foraging behavior of subterranean termites in desertified and relatively intact Chihuahuan desert ecosystem. *Applied Soil Ecology* 12:149-157.
41. Whitford WG, Vanzee J, **Nash MS,** and Smith W. 1999. Ants as indicators of exposure to environmental stressors. *Environmental Monitoring and Assessment*. 54: 143-171.
42. **Nash MS**, Whitford WG, Vanzee J, and Havstad K. 1998. Monitoring Changes in Stressed Ecosystem Using spatial patterns of ant communities. *Environmental Monitoring and Assessment* 51:201-210.
43. **Nash MS**, Toorman A, Wierenga PJ, Gutjahr A, and Cunningham G. 1992. Estimation of vegetative cover in an arid range land based on soil moisture using cokriging. *Soil Science*. 154:25-36.
44. **Nash MS**, Wierenga PJ, and Gutjahr A. 1991. Time series analysis of soil moisture and rainfall along a line transect in arid rangeland. *Soil Science* 152:189-198.
45. Hendrickx JMH, Wierenga PJ, and **Nash MS.** 1990. Variability of soil water tension and soil water content. *Agriculture Water Management* 18:135-148.
46. **Nash MS**, Wierenga PJ, and Butler-Nance A. 1989. Variation in tension, water content and drainage rate along a 91 m transect. *Soil Science* 158):94-101.

47. Greenholtz, DE, Yeh TCJ, **Nash MS,** and Wierenga PJ. 1988. Geostatistical analysis of soil hydrologic properties in a field plot. *Journal of Contaminant Hydrology*, 3:227-250.
48. Hendrickx JMH, Wierenga PJ, **Nash MS**, and Nielsen DR. 1986. Boundary location from texture soil moisture and infiltration rate. *Soil Science Society of America* 50:1515-1520.

## 1. BOOK CHAPTERS, CONFERENCES, PROCEEDINGS, MONOGRAPHS

1. **Nash MS** (Proceeding), Chaloud DJ, and Kepner WG. 2010. Locating Changes in Land Use from Long Term Remote Sensing Data in Morocco; *American Statistical Association: Joint Statistical Meeting 2010 Proceedings* (August 1-6 2009, Washington DC). pp 34-41.
2. **Nash MS,** (Proceeding) and Lopez RD. 2010. Application of Partial Least Square (PLS) Regression to Determine Landscape-Scale Aquatic Resources Vulnerability in the Ozark Mountains, *American Statistical Association: Joint Statistical Meeting 2010 Proceedings*, Vancouver, Canada, July 31-Aug 5 2010. pp 3588-3597
3. Jones KB (Book chapter), Hamann S, **Nash MS**, Neale AC, Kepner WG, Wade TG, Walker J, Müller F, Zurlini G, Zaccarelli N, Jongman R, Nedkov S, and Knight GC. 2008. Cross-European Landscape Analyses: Illustrative examples using existing spatial data. p. 263-316 in: Petrosillo I, Müller F, Jones BK, Zurlini G, Krauze K, Victrove S, Li BL, and Kepner WG (eds.), Use of Landscape Sciences for the Assessment of Environmental security: *NATO Science for Peace and Security Series C: Environmental Security*. Springer. Netherlands.
4. **Nash MS** (Book Chapter), Chaloud DJ, Kepner WG, and Sarri S. 2008. Regional Assessment of Landscape and Land Use Change in the Mediterranean Region: Morocco Case Study (1981-2003). In: P. Liotta, D. Mouat, W.G. Kepner, and J.M. Lancaster (eds.), Environmental Change and Human Security: Recognizing and Acting on Hazard Impacts. *Science for Peace and Security Series*, Springer Publishers, The Netherlands. Published in cooperation with NATO Public Diplomacy Division. ISBN 978-1-4020-8549-9, pp143 – 165.
5. **Nash MS** (Proceeding), Chaloud DJ, and Kepner WG. 2007. Integration of statistics, remote sensing and existing data to locate changes in land resources: Morocco Case Study. 26th *Annual National Conference on Managing Environmental Quality Systems*, June 11-14, 7, Cleveland, Ohio. Proceeding http://www.epa.gov/quality/meeting.html";
6. **Nash MS** (Book chapter), Wade TG, Heggem DT, and Wickham JD. 2006. Does Anthropogenic Activities or Nature Dominate the Shaping of the Landscape in the Oregon Pilot Study Area for 1990-1999? p. 305-323 in William G. Kepner, Jose L. Rubio, David A. Mouat and Fausto Pedrazzini (eds.), Desertification in the Mediterranean Region: A security Issue. Series C: *Environmental Security* Vol 3. Springer. Netherland.
7. Mehaffey MH, Wade TG, **Nash MS**, and Edmonds CM. 2003. Analysis of Land Cover and Water Quality in the New York Catskill-Delaware Basins, p. 1327-1339 in D.J. Rapport, W.L. Lasley, D.E. Rolston, N.O. Nielsen, C.O. Qualset, and A.B. Damania (eds.), Managing for Healthy Ecosystems, Lewis Publishers, Boca Raton, Florida USA.
8. **Nash MS,** and Whitford WG. 2001. ***(International)*** Ants as Biological Indicators for Monitoring Changes in Arid Environments: Lessons for Monitoring Protected Areas. Research and Management Options for Protected Areas*: Proceedings of the 1st International Symposium and Workshop on Arid Zone Environments, Environmental Research and Wildlife Development Agency, Abu Dhabi, 23rd - 25th Jan. 2000, Abu Dhabi, UAE*. 105-121.
9. Flint, A.L., Nash, M.H., and Nash M.S., Hydrologic property alterations due to elevated temperature at Yucca Mountain. United States: N.P., Dec. 31, 1994. Conf-940553-90 https://www.osti.gov/biblio/113826 accessed May 2018.

## 2. OTHER (RESEARCH REPORTS, DATA BROWSER, ETC.)

1. **Nash MS** and Christensen J (Methodology and Analyses). 2017. Description of changes in climatic indices in USA over 25 years (1989 – 2013). *EPA*/600/S-17/256/Oct 2017. https://www.epa.gov/enviroatlas/enviroatlas-publications

2. Pitchford A, Christensen J, Chaloud D, **Nash MS** (Methodology and Analyses), and Snell R. 2013. Identifying and characterizing small waterbodies. Phase1: Approach and analysis for the state of Indiana. 20. *EPA*/600/R-13/266/Sep 13.
3. Ely CC, Kepner WG, Goodrich DC, and **Nash MS**. 2013. Investigating Historic Parcel Changes to Understand Land Use Trends: A Methodology and Application for the San Pedro River Watershed". *EPA*/600/R-13/112; ARS/295385 July 2013.
4. Allen PE (Database), **Nash MS**, Lopez RD, Christensen JR, Pitchford AM, Tallent-Halsell NG, Butler L, and Ohman B. 2011. Characterization and Mapping of Ecosystem Services (CMESs) Data base Version 1.0. 2011. EPA/600/C-11/003, April 2011.
5. Christensen JR (Methodology), Lopez RD, **Nash MS**, Neale AC, Ebert DW, and Allen PE. 2009. Method Development for Mapping Wetlands and their Ecosystem Functions and Services: Year 1 Progress Report (Internal Report). 2009. *EPA*/600/X-09/013 Sep 09
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## 4. PRESENTATIONS/POSTERS

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